Divorce and the Business cycle: A cross-country analysis

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Divorce and the Business cycle: A cross-country analysis

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Abstract: In this paper, we examine the role of the business cycle in divorce. To do so, we use a panel of 30 European countries covering the period from 1991 to 2010. We find a negative effect of the unemployment rate on the divorce rate, pointing to a pro-cyclical evolution of the divorce rate, even after controlling for socio-economic variables and unobservable characteristics that can vary by country, and/or over time. Results indicate that a one-percentage-point increase in the unemployment rate involves almost 0.02 fewer divorces per thousand inhabitants. The impact is small but significant, representing around 1% of the average divorce rate in Europe during the period considered. Supplementary analysis, developed to explore a possible non-parametric pattern, confirms a clearly negative relationship between unemployment and divorce in European countries, with the inverse relationship being more pronounced when the unemployment rate is greater than 15%.

Keywords: Divorce, unemployment, business cycle.

JEL: C14, C23, J12.

1. Introduction

Since 2007, European countries have been in the throes of a severe economic crisis with the destruction of jobs reaching levels not seen in many decades. Several researchers have suggested that this has had serious socio-demographic consequences and significant costs. Even the media have paid attention to the impact of these economic problems on a variety of factors, such as the marital dissolution. For example, *the New York Times* highlighted the negative impact of Spain's 'Great Recession' on the probability of divorce.[1] This is by no means an isolated case, and we have undertaken to explore whether, in fact, variations in the business cycle do effect divorce decisions.[2]

We are not the first to study the relationship between fluctuations in the business cycle and marital dissolution. However, most of the (somewhat sparse) economic literature examining the relationship between the business cycle and divorce has concentrated on the US case (Amato and Beattie, 2011; Baghestani and Malcolm, 2014; Hellerstein and Morrill, 2011; Schaller, 2013). Fewer studies have been done on this issue for other countries, but some examples are papers by Jensen and Smith (1990) for Denmark, Fischer and Liefbroer (2006) for the Netherlands, and Ariizumi et al. (2015) for Canada. In our case, we add to the literature by examining the issue for a panel of 30 European countries.

For a theoretical overview of the topic, we initially focus on Gary Becker's earlier work, in which he suggests that married individuals separate when the expected utility in the situation of divorce, or even in a potential remarriage situation, is greater than the expected utility from remaining married (Becker et al., 1977). In that framework, the indications are that male job losses decrease the gains derived from marriage, thus increasing the probability of divorce. Then, since the empirical evidence points to a greater negative effect of the economic crisis on male employment than on females (Hoynes et al. 2012), we would expect a positive relationship between unemployment rates and divorce rates. Nevertheless, when marriage is considered as insurance against economic problems, it should be expected that the greater the unemployment rate, the lower the divorce rate (Shore, 2009; Stevenson and Wolfers,

[1] "*Hard Times in Spain Force Feuding Couples to Delay Divorce*", The New York Times, http://www.nytimes.com/2012/12/18/world/europe/hard-times-in-spain-force-feuding-couples-to-delay-divorce.html?pagewanted=all&_r=1&

[2] In the literature, it is possible to find several potential determinants of divorce; e. g., unilateral divorce reforms (Friedberg, 1998; Wolfers, 2006), Child Custody and Child Support laws (González-Val and Marcén, 2012), price stability (Nunley, 2010) and culture (Furtado et al., 2013), among others.

2007). In general, these studies propose opposite effects, as Ariizumi et al. (2015) do. Using a theoretical model, Ariizumi et al. (2015) explain that the probability of divorce can increase or decrease when unemployment rates rises. The sign of the effect depends on the balance of the economic crisis impacts on the gains derived from marriage, and on the quality of those without a partner that divorcees may potentially match with.

There are other possible theoretical alternatives to explain the impact of the business cycle on divorce; for example, Amato and Beattie (2011) explore three perspectives: the psychosocial stress perspective, the cost-of-divorce perspective, and the hybrid perspective. The first perspective suggests that the loss of a job produces psychosocial stress, which in turn can affect divorce decisions. As those authors claim, the effect should be greater when the variables are lagged, since the stress of decreasing employment opportunities takes time to affect the marital dissolution. The second alternative, the cost-of-divorce perspective, points to an inverse relationship between unemployment and divorce, because divorce can be a costly process and a job loss situation generates economic constraints. The last perspective combines the other two; in this case, the unemployment rate should be negatively associated with the divorce rate when both rates are measured in the same year, so divorce costs would be driving contemporary divorces, and positively associated when the divorce rate is measured in subsequent years, because the psychosocial stress increases over time. As noted, these theoretical perspectives do not indicate an a priori clear relationship between business cycle variations and divorce.

Few papers have developed empirical work to investigate which, if any, of these alternative explanations is dominant. The initial work on this issue concludes that divorce rates behave in a pro-cyclical way (Ogburn and Thomas, 1922; Stouffer and Spencer, 1936; Kirk and Thomas, 1960). Similar results are obtained in more recent studies using state-level - or individual-level - data for the US (Baghestani and Malcolm, 2014; Hellerstein and Morrill, 2011; Amato and Beattie, 2011; Hellerstein et al., 2013; Schaller, 2013). There is one exception: South (1985) finds small positive effects of unemployment on the divorce rate using national-level data for the US. For other countries, Fischer and Liefbroer, (2006) show a negative effect of consumer confidence on divorce rates in the Netherlands, and in the case of Denmark, Jensen and Smith (1990), using panel data for married couples, conclude that unemployment is a relevant factor in marital instability. Their findings point to an immediate positive effect

of male unemployment on divorce. No impact of unemployment on divorce can be found in the analysis of the Canadian case (Ariizumi et al., 2015). It is, then, reasonable to state that the empirical results are mixed.

In our work, we utilize European data on divorce rates from 1991 to 2010, measured at the country level.[3] Following prior studies, we use information on national unemployment rates during the same period to measure variations in the business cycle. Our results suggest that the divorce rate and the unemployment rate are negatively associated, even after including controls for unobservable characteristics that can vary at the country level and/or over time, and controls for other observable characteristics such as the median age and the female labor-force participation rate. This finding points to the pro-cyclical behavior of divorce.

Since couples may react by putting off their marital decisions if there are changes in labor market conditions, there can be a lagged impact of the unemployment rate on divorce, as suggested by Schaller (2013), and Amato and Beattie (2011). To address this issue, we include lagged unemployment rates in our analysis. Although the duration of the lag is not clear, we consider lags from 1 to 2 years since there can be a period of time between the divorce decision and when the process of divorce can be finalized. Results show that only the contemporaneous unemployment rate has an effect on divorce for our sample of European countries.

Later in this paper, we present a novel contribution to the existing literature by examining the possible non-linear response of divorce rates to fluctuations in the business cycle. We do this since the influence of certain country characteristics, such as the unemployment rate, may not be the same across the distribution of divorce rates. To explore this issue, we use non-parametric tools that do not impose a structure on the underlying relationships. Results suggest that the decrease in divorce rates is greater when the unemployment rate is between 15% and 30%, but it is still a pro-cyclical response. Our findings point to a greater negative impact on divorce rates in countries with higher levels of unemployment rates, a feature that normally coincides with severe recession periods.

The remainder of the paper is organized as follows. Section 2 presents the data used. In section 3, we describe the methodology and our main results. Section 4 presents

[3] These countries have quite homogenous divorce law legislations (González and Viitanen, 2009; Furtado el al., 2013).

the lag specifications. The non-parametric analysis is conducted in Section 5, and Section 6 presents our conclusions.

2. Data

The divorce rate data covers 30 European countries for the period 1991 to 2010,[4] and is publicly available from Eurostat.[5] Divorce is defined as the final legal dissolution of marriage as authorized by the laws of each country. The divorce rate is calculated as the ratio of the number of divorces during the year per 1,000 inhabitants (population data come from the Penn World Table (Feenstra et al., 2013)). This rate is the standard measure of the evolution of divorce, provided by all National Statistical Offices and International Organizations. Much of the recent literature uses divorces per thousand of population as the main dependent variable in their studies (see Friedberg, 1998, Wolfers, 2006, and González and Viitanen, 2009, among many others). However, we recognize that the rates may be affected by the marital status structure of the populations to which they relate. Divorce rates may be low either because marriage rates are low, or because marriages are less likely to end in divorce (Furtado et al., 2013). To examine this issue, we could have utilized total divorce rates, defined as the annual number of divorces per 1,000 married inhabitants, but this analysis would have been less reliable due to the scarcity of data on the married population, which is only available when each census is collected, normally every 10 years (Furtado et al., 2013).[6] Thus, we favor the use of the crude divorce rate with a longer series but we have also repeated the analysis using total divorce rates, see Appendix.

In order to measure business cycle fluctuations, we use unemployment rates for the same period. Unemployment refers to the share of the labor force that is without work, but is available for and seeking employment. It is a common indicator of economic conditions, highly publicized and used, which picks up not only the effects of individual job losses but also the variations in economic uncertainty. This aggregate variable can be useful in analyzing divorce behavior, since it is less likely to be endogenous to divorce decisions than other income or employment measures, such as

[4] Because of problems of availability of data on the divorce rate, we could not include in the analysis the following European countries: Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kosovo, Liechtenstein, Malta, Moldova, Monaco, Montenegro, Russia, San Marino, Serbia, Turkey and Ukraine.
[5] We fill in the gaps using information from the UN Demographic Yearbooks, several issues.
[6] Although there can be some concerns about the use of the crude divorce rate, it is worth noting that other papers containing information on both the crude divorce rate and the total divorce rate do not find differences in their results (see González-Val and Marcén, 2012, and Marcén, 2015). They show that both rates behave in the same way.

own wages (Schaller, 2013). The unemployment rate is defined as the percentage of unemployed individuals in the labor force (see The World Bank; World Development Indicators), and it includes changes in both labor demand and labor supply. There are also some concerns about the use of this variable, since it can understate the magnitude of a recession by not incorporating discouraged workers, and it can be a lagged indicator of economic recession. However, as Schaller (2013) points out, despite these weaknesses, it is the best available proxy to capture changes in the labor market conditions of married couples.

Table 1 shows the list of the 30 European countries considered and the average divorce and unemployment rates for each country over the sample period. These summary statistics appear to reveal certain regional patterns. Most Northern, Western and Central European countries, such as Austria, Belgium, Denmark, Czech Republic, Germany, Hungary, Luxembourg, The Netherlands, Norway, Sweden, Switzerland and the UK, have unemployment rates below the average and divorce rates above the average of Europe. Other countries in the same regions present unemployment rates above the average, with higher divorce rates, such as Finland and France, or with low unemployment and divorce rates, such as Ireland and Slovenia. Eastern European countries, such as Estonia, Latvia, and Lithuania, display high unemployment and divorce rates. Southern and Southeastern European countries, like Bulgaria, Croatia, Greece, Italy, FYR Macedonia, Portugal, Romania and Spain have divorce rates lower than the average, with the lowest being those of FYR Macedonia. However, for those countries, the pattern is not the same with respect to the unemployment rate. Bulgaria, Croatia, Italy and Greece have high unemployment rates, and we observe even higher rates in FYR Macedonia and Spain, whereas Portugal and Romania have below-average unemployment rates. As can be seen in Figure 1, there are also significant differences across countries in the evolution of the rates of divorce and unemployment over time. Not all individual countries conform to the same behavior. From the graph, it is difficult to determine a clear pattern in the relationship between the divorce and the unemployment rates.

Figure 2 shows the temporal evolution of the average aggregate divorce and unemployment rates, and it is now easier to discern the movement of the rates. The divorce rate begins with a slight increase from 1991 to 1992, then decreases, and from 1993 to 1995 again rises. This coincides with opposite movements for the

unemployment rate. Although the unemployment rate increases as the divorce rate does from 1991 to 1992, after that the steep rise of the unemployment rate echoes the fall in the divorce rate. From 1993 to 1994, the unemployment rate is smooth, whereas the divorce rate is stable. Afterwards, the unemployment rate considerably decreases until 1998 and remains stable, or decreases a little, from that year to 2004. The divorce rate rises from 1994 to 1995, then deflates, to remain around 1.9 divorces per thousand inhabitants until 2000. Part of the drop in the divorce rate during that period is due to the introduction of divorce in Ireland, which presents quite low divorce rates. The Family Law Act regulating divorce was passed in 1996 in that country, although the act was not in force until 1997.[7] From that year, the divorce rate takes off until 2007, corresponding with the most rapid drop in the unemployment rate from 2004 to 2008. Since that year, the unemployment rate rises rapidly until the end of our sample period, whereas the divorce rate dramatically declines, then slightly increases during the last year considered. This quick glance at the unemployment and divorce rate series appears to suggest the existence of a pro-cyclical response of divorce to the business cycles, at least at the aggregate level.[8] Of course, this is not a conclusive analysis. In the subsequent sections, we provide evidence of the relationship between unemployment and divorce rates.

3. Methodology and results

We estimate the following equation:

$$DR_{it} = \alpha + \beta Unemp_{it} + \Gamma' X_{it} + \Pi' T_{it} + \phi\eta_i + \varepsilon_{it}, \qquad (1)$$

where DR_{it} is the crude divorce rate of country i in year t and $Unemp_{it}$ is the unemployment rate of country i in the year t. X_{it} is a set of country-specific demographic controls, including the median age and the female labor-force participation rate, and η_i is a vector of country fixed effects ($\sum_{i=1}^{n-1} Country_i$) that picks up the impact of unobserved characteristics that vary at the national level. T_{it} is a matrix of time variables, incorporating: time fixed effects ($\sum_{t=1}^{t-1} Year_t$), country-specific linear time

[7] The rest of the countries introduced divorce many years earlier. All the analysis presented in this work has been repeated without Ireland and results do not change.
[8] The pattern of the crude divorce rate coincides with that of the total divorce rate, see Appendix A.

trends ($\sum_{i=1}^{n-1} Country_i \cdot Time_t$), and quadratic country-specific time trends ($\sum_{i=1}^{n-1} Country_i \cdot Time_t^2$) that allow us to capture the effect of unobserved characteristics that vary over time. ε_{it} is the error term. This framework exploits variations over time and across countries in unemployment behavior, as Amato and Beattie (2011) and Schaller (2013) do for US states. The identification strategy of the relationship between unemployment and divorce rates is based on the exogeneity of variation in country unemployment rates, following Schaller (2013). As we mention above, from a theoretical point of view, it is not clear whether divorce rates respond in a pro-cyclical way, or not. Therefore, the sign of the β coefficient could be positive (counter-cyclical behavior) or negative (pro-cyclical behavior).

Table 2 shows regression results for the model presented in Equation (1), with all the regressions weighted by country population. Without any controls, column (1), the estimated coefficient picking up the impact of the unemployment rate is statistically significant and negative, pointing to a pro-cyclical reaction of divorce.[9] Results are similar after adding controls for country and year fixed effects, in addition to country-specific linear and quadratic time trends, column (2), although the magnitude of the effect decreases (in absolute value). This is not striking, since after the inclusion of all those controls we are removing the effect of unobservable characteristics that can vary at the country level and/or over time, such as cultural differences (Furtado, et al. 2013). Our results indicate that a 1% increase in the unemployment rate is related to almost 0.02 fewer divorces per thousand individuals (on average).[10] As in the case of Schaller (2013) for the US, this appears to be a minor impact, although it is economically significant, as it represents 1% of the average European divorce rate during the period considered. Note that the analysis developed in this section does not take into consideration that the impact of the considerable differences in unemployment rates may vary across the distribution of divorce rates. We revisit this issue in Section 5.

We have also added controls for observable characteristics in column (3). If older individuals are less likely to get divorced (Peters, 1986) and they are less likely to be unemployed, then the older the population, the lower would be the expected

[9] We have repeated all the analysis with/without population weights, and with/without clustering the standard errors, and results do not vary.

[10] In the case of Ireland, there is only data on divorce since 1997 because divorce was not allowed before that date. As we mention above, our findings do not change when Ireland is excluded from the sample.

unemployment and divorce rates. Thus, it is possible to argue that we are picking up differences in the age-structure of the population, in addition to the relationship between unemployment rates and divorce rates. To tackle this issue, we have added the median age of each country population (data source: Eurostat) in column (3).[11] The estimated coefficient is not statistically significant, which can be explained by the recent findings of Bruze et al. (2015) that the costs of divorce are high in the earlier and later stages of marriage, pointing to a lesser importance of the age-structure. Female labor-force participation is also included in column (3) as a control. This variable is measured as the percentage of the female population over age 15 who are economically active (data source: World Development Indicators). We add this variable since it is possible to hold that changes in divorce rates are driven by the participation of women in the labor force (Allen, 1998; Nunley and Zietz, 2008). If a woman is inactive, her husband's job loss could lead to greater economic problems than in the case that she is economically active, increasing the difficulties of pursuing a costly divorce. The inclusion of the female labor-force participation rate, along with the median age does not change our results.

Another potential source of bias in our estimates can appear in the case that the variations in the unemployment rate could be driven by variations in marriage and divorce rates. If more women remain single, or, if divorced, do not re-marry, then more women may be participating in the labor market (Fernández and Wong, 2014a; 2014b). However, it is not clear whether decreases or increases in women's participation in the labor market correspond with variations in the overall unemployment rate (Schaller, 2013). Additionally, the increase in divorce rates has been found to account for a very small part of the increase in female employment rates (Eckstein and Lifshitz, 2011). Since men are less likely to vary their participation in the labor market due to changes in their marital status, we have repeated the analysis using the male unemployment rate defined as the percentage of men in the labor force who are without work but available for and seeking employment (see a similar analysis in Schaller, 2013). Results are quite similar, columns (4) to (6) in Table 2. We detect an inverse relationship between male unemployment and divorce. Even the magnitude of the impact of unemployment on divorce is the same as it was in columns (2) and (3) after adding all controls, columns (5) and (6). Being aware of all these concerns, it is re-assuring that adding or deleting all

[11] There is only information from 2001 in the case of Croatia. For consistency, we run all the analysis without the information for this country, and results are unchanged.

controls, and/or changing the unemployment rate, does not vary our findings on the relationship between unemployment and divorce rates.[12] All these results are also unchanged if the dependent variable is re-defined, see Appendix B. In Table B1, the divorce rate is measured as the annual number of divorces per 1,000 married females. The magnitude of the effect varies but this is not surprising since the definition of the dependent variable changes in those specifications.

It is arguable that not only the shock of job loss influences divorce decisions, but also the impact of the evolution of the business cycle on the household income of couples, whether or not one spouse is unemployed. Divorce can be more tempting for those married individuals who can afford to maintain their standard of living outside of marriage, implying a positive relationship between income and divorce (Furtado et al., 2013). Then, those who would endure greater economic constraints, because of an economic recession, would be less likely to divorce. The association between income and divorce could also be negative since high-income couples normally own assets (large houses, second residence, investments expensive furniture, etc.), which are difficult to sell during an economic recession (for division after a divorce) (Becker et al., 1977). To tackle this, we use country GDP per capita in logarithm, calculated in US dollars at 2005 constant prices (data source: Penn World Table by Feenstra et al., 2013), as a proxy for household income.[13] These estimates are displayed in columns (7) to (9) of Table 2. We obtain a positive and statistically significant impact of GDP per capita on divorce without controls, column (7). However, the coefficient capturing the effect of GDP per capita is not statistically significant, although it remains positive, after the inclusion of country and year fixed effects, in addition to country-specific linear and quadratic time trends, column (8). The same non-statistically significant coefficient, though with a negative sign, is detected even when we add the unemployment rate variable, in column (9). With respect to the effect of the unemployment rate, we observe no changes and the divorce rate is negatively associated with the unemployment rate.

[12] We have re-run all the analysis excluding each country at a time and also excluding those countries presenting the highest and the lowest unemployment and divorce rates. Results do not change substantially.

[13] There is no data for Latvia and Lithuania until 1993. For consistency, we have repeated the analysis without those countries. Results do not vary.

4. Lag specification

Thus far, we have examined the contemporary effect of unemployment rates on divorce rates. Nevertheless, we mentioned before that the economic constraints generated by a job loss could lead couples to postpone their divorce decisions because they cannot afford to pursue a costly divorce. These couples are forced to support themselves, together. As times passes, the cumulative psychosocial stress is greater, for example, because of the increased level of friction between individuals who, in many cases, 'cannot stand each other'. In such cases, some couples may decide to divorce in spite of their economic problems. As Amato and Beattie (2011) explain, we would expect a negative effect of the contemporaneous unemployment rate on divorce, and a positive impact of the lagged unemployment rates.

To explore this, we add the lagged unemployment rates to Equation (1). As Schaller (2013) and Amato and Beattie (2011) explain, the duration of the lag is not clear. We add lags from 1 to 2 years since there can be a period of time between the divorce decision and when the divorce takes place depending, for example, on the separation period requirements.[14] The estimated coefficients are reported in Table 3. In column (1), with no controls added, we find a negative association between the contemporaneous unemployment and divorce rates, and also between the unemployment rate lagged 2 years and the divorce rate, whereas a significant positive effect is detected in the case of the unemployment rate lagged 1 year. The coefficients picking up the impact of the lagged unemployment rates are no longer statistically significant, once the controls for unobservable characteristics are included (see column 2). There, we only see an inverse relationship between the contemporaneous unemployment rate and the divorce rate. The cumulative total effect of unemployment on divorce is -0.025, with the F-stat for joint significance being 4.47 ($p>F=0.043$). The same is observed when we include the female labor-force participation rate and the median age variables in column (3). As in the previous section, we have repeated the analysis using the male unemployment rate instead of the whole unemployment rate, to tackle the issue of potential bias that that variable can generate. Column (4) reports the estimates showing no differences, and even the magnitude of the impact is quite similar. Once again, we find a negative association between the unemployment and divorce

[14] This analysis has been repeated including more lags. We obtain the same results.

rates. This is also maintained if the divorce rate is defined as the total divorce rate, see Table B2 in Appendix B.

With an argument on divorce costs similar to that used to justify the use of lagged unemployment rates, it is possible to suppose that the impact of variations in household income (without implying a job loss) due to business cycle fluctuations can also be lagged. Here, we also use as a proxy, the per-capita GDP. The estimates after including that variable, and its lags, are reported in columns (5) to (7) of Table 3. The estimated coefficients capturing the impact of the contemporaneous per-capita GDP and its lags are not statistically significant after the inclusion of the controls (see columns 6 and 7). Indeed, this does not change when the unemployment rate variable and its lags are incorporated in column (7). Respecting the estimates of the unemployment rate and its lags, we observe similar results in columns (3) and (7); there is a negative association between the contemporaneous unemployment rate and the divorce rate. Therefore, using European data, we find no evidence in favor of the psychological approach, which is in line with the work of Amato and Beattie (2011) and Schaller (2013) with US data.

5. Nonparametric analysis

In this section, we use an alternative approach. The results presented above are derived from linear models; however, one can surmise that variables respond in a nonlinear way. In our case, part of the variation in divorce rates may reflect the fact that the influence of certain country characteristics, particularly the unemployment rate, is not uniform across the distribution of this variable. To model these possible heterogeneous effects of the unemployment rate on the divorce rates, we use nonparametric tools. Eeckhout (2004) and Ioannides and Overman (2004) highlight the advantages of this over the standard parametric approach (e.g., a correlation index). Basically, nonparametric tools do not impose a structure on the underlying relationships, which may be nonlinear and may change over time.

First, we study how the distribution of divorce rates is related to the distribution of unemployment rates (Ioannides and Overman, 2004). Figure 3 shows the stochastic kernel estimation of the distribution of crude divorce rates, conditional on the distribution of unemployment rates on the same date, for a pool of 594 observations from our sample of 30 European countries over the 1991-2010 period. To facilitate the interpretation, the contour plot is also shown. If both distributions were independent, the contour plot would show the estimated density around a vertical or horizontal straight

line. Nevertheless, although the estimated density is rather concentrated, the plot reveals a negative relationship between the two distributions: the lower the unemployment rates, the higher the divorce rates.

Second, we conduct a nonparametric estimation of the effects of unemployment on divorce rates. To do this, we estimate the nonlinear relationship between the unemployment and divorce rates using a local polynomial smoothing for the pool of 594 observations from 1991 to 2010.[15] Figure 4 shows the results, including the 95% confidence intervals. This graph complements Figure 3. The negative relationship is clear; as the unemployment rates increase, the divorce rates decrease. This result confirms the estimated effect obtained previously in Section 3. Furthermore, Figure 4 shows a nonlinear effect: the decline in divorce rates is greater, the higher the unemployment rates (with the exception of the small recovery at the upper tail of the distribution, for unemployment rates above 30%).[16] Thus, the decrease in divorce rates is greater when the unemployment rate is between 15% and 30% than when it is below 15%. Specifically, when the unemployment rate is above 15%, an increase of 1% in the unemployment rate is associated with a drop of around 0.1 divorces per thousand individuals. This effect is five times greater than that observed with the linear analysis.

6. Conclusion

The aim of this paper is to provide evidence on the impact of business cycles on divorce rates. From a theoretical point of view, the relationship is not clear. The effects vary, depending on the benefits (the view of marriage as insurance) or costs (psychological stress) that staying married can generate for a couple who has decided to divorce, on the specific costs of divorce, and on the possibilities outside marriage (remarriage and/or being able to maintain the same standard of living). The empirical evidence for these issues is quite scarce, mainly focused on the US, and much of what there is shows contradictory results.

In our work, we extend the analysis to cover 30 European countries over the period from 1991 to 2010. During this time, all but one of the countries considered have had legalized divorce for many years. There are no significant changes in divorce law

[15] The local polynomial provides a smoother fit for the divorce rate to a polynomial form of the unemployment rate, via locally-weighted least squares. We used the *lpolyci* command in STATA with the following options: local mean smoothing, a Gaussian kernel function to calculate the locally-weighted polynomial regression, and a bandwidth determined by Silverman's (1986) rule-of-thumb.

[16] That small recovery for an unemployment rate greater than 30% is not observed when the FYR Macedonia is excluded from the analysis.

legislation that can drive the evolution of divorce rates, and almost all the countries considered either belonged to the European Union in 1991, or joined the EU during the period considered. Of the remainder, several of the non-member countries are candidates for entry to the EU. In this framework, we examine the relationship between the business cycle and divorce, using the unemployment rate as the main proxy for the evolution of economic conditions (as is common in the literature). Our findings suggest that divorce rates respond in a pro-cyclical way to variations in the business cycle, since we find empirical evidence of a significant negative association between unemployment rates and divorce rates. This is consistent with most of the recent works using US aggregate data. Our results are quite robust to the introduction of controls, such as country and year fixed effects, in addition to country-specific linear and quadratic trends, controls that allow us to capture the impact of unobservable factors, and to the use of different sub-samples. Then, it appears that the economic constraints generated by the loss of a job can make resorting to a costly divorce less likely, but it is also possible that the economic uncertainty generated by recession and high unemployment rates also discourage divorce decisions.

We should note that the magnitude of the effect is quite small, although economically relevant, since a 1% increase in the unemployment rate is associated with 0.02 fewer divorces per thousand inhabitants, representing 1% of the average European divorce rate during the period considered. This small impact is not limited to our analysis; it is also observed in the case of the US (see Schaller, 2013). The timing analysis also points to a small negative effect of the contemporaneous unemployment rate on the divorce rate. Results do not vary when we change the definition divorce rate and/or the definition of the unemployment rate to consider only the male unemployment rate, in order to avoid endogeneity concerns, because male labor-market participation is less likely to change when the marital status varies.

Finally, our analysis makes use of nonparametric tools to re-examine the relationship between unemployment and divorce rates, because of the possible nonlinear response of divorce to unemployment variations. This could be the case if, for example, divorce decisions vary depending on the severity of the economic recession. The results show a clear negative relationship between unemployment and divorce rates, but when the unemployment rate is above 15%, an increase of 1% in the unemployment rate is related to 0.1 fewer divorces per thousand individuals. This figure is five times greater

than the estimated effect of the linear analysis. Thus, our findings suggest that severe economic recessions, corresponding to higher unemployment rates, can dissuade couples from seeking a divorce.

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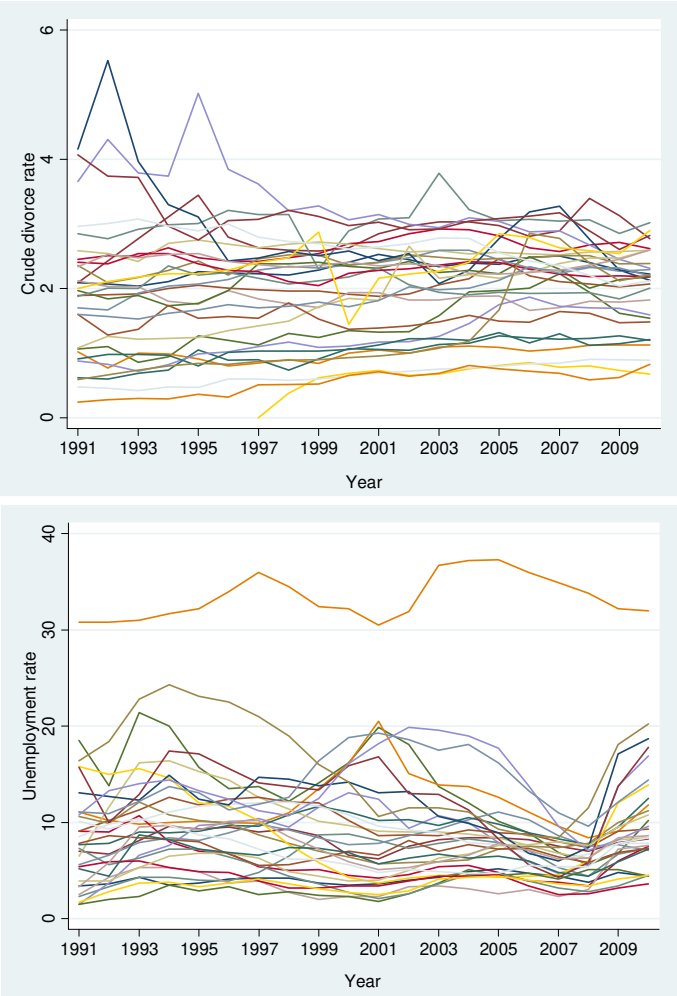
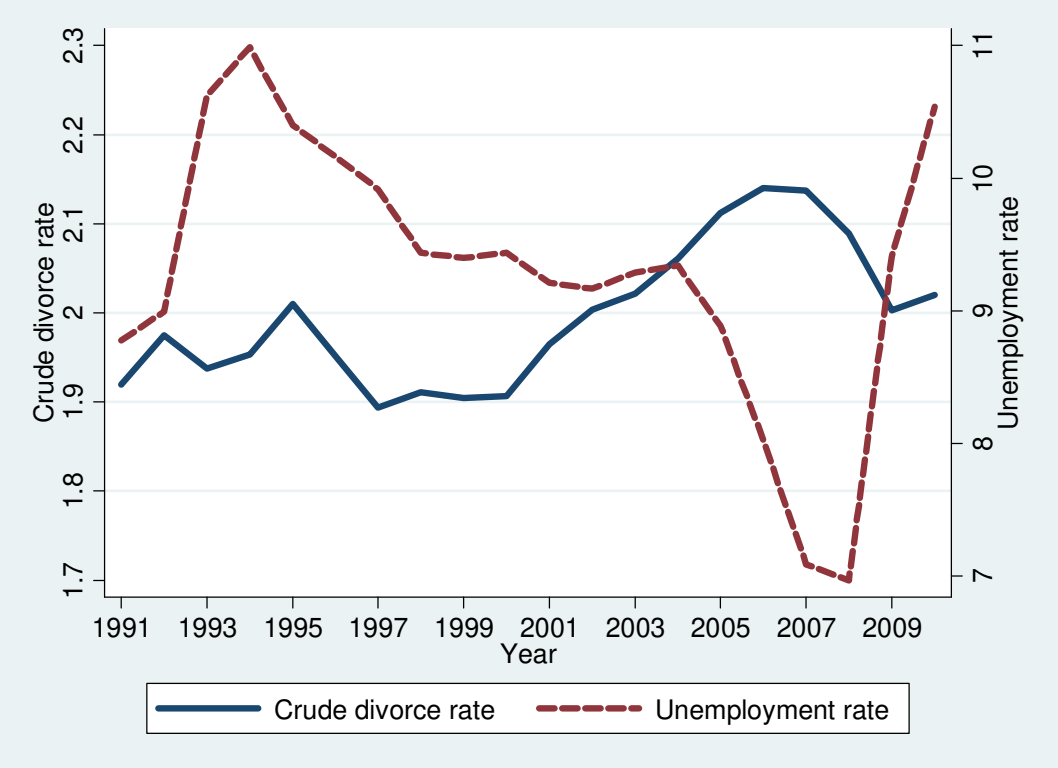
Figure 1. Divorce and unemployment rates by country



Data source: World Development Indicators (The World Bank), Eurostat, and United Nations Demographic Yearbooks.

Figure 2. Average divorce and unemployment rates in Europe (30 countries)



Notes: Non-weighted averages for a pool of 30 European countries. Data source: World Development Indicators (The World Bank), Eurostat, and United Nations Demographic Yearbooks.

Figure 3. Stochastic kernel estimates of the relationship between divorce and unemployment rates

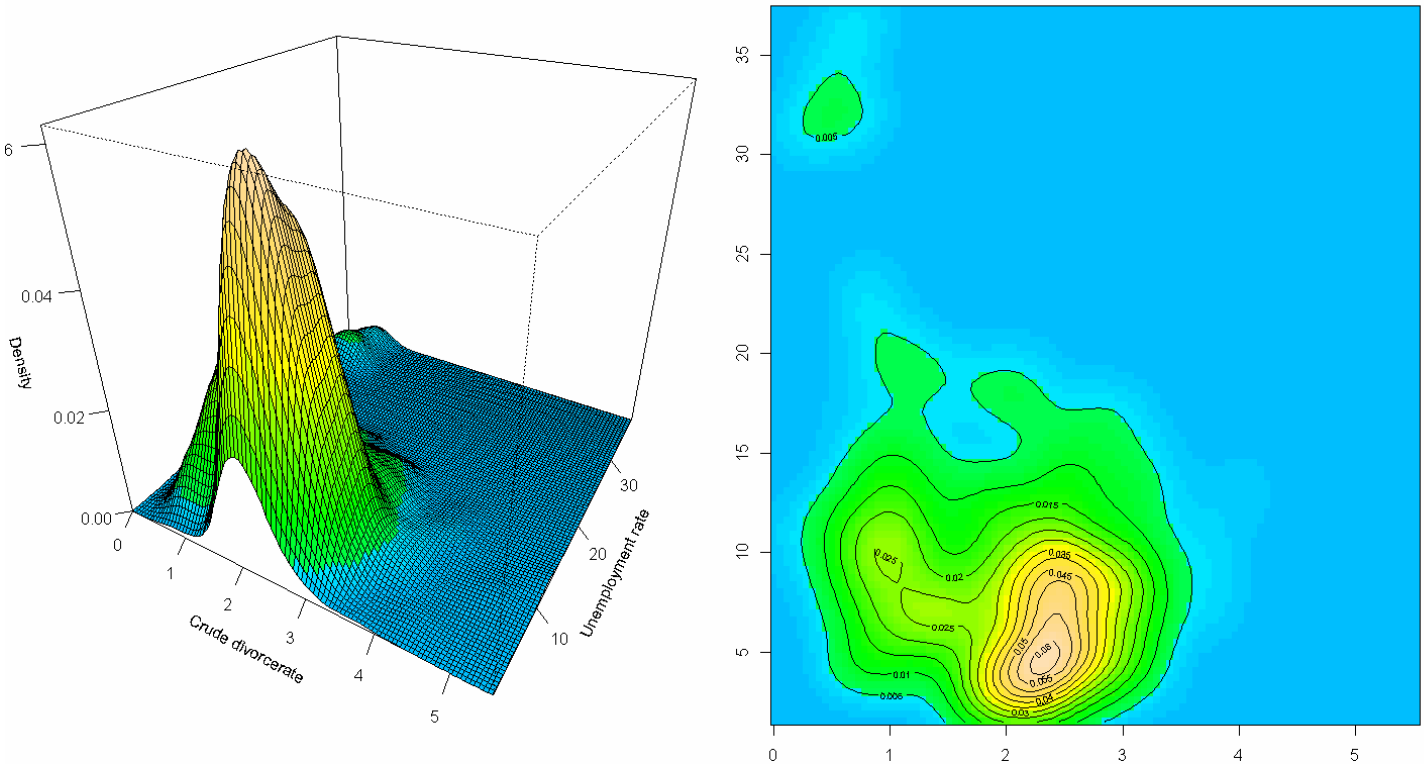


Figure 4. Nonparametric estimation of the relationship between divorce and unemployment rates

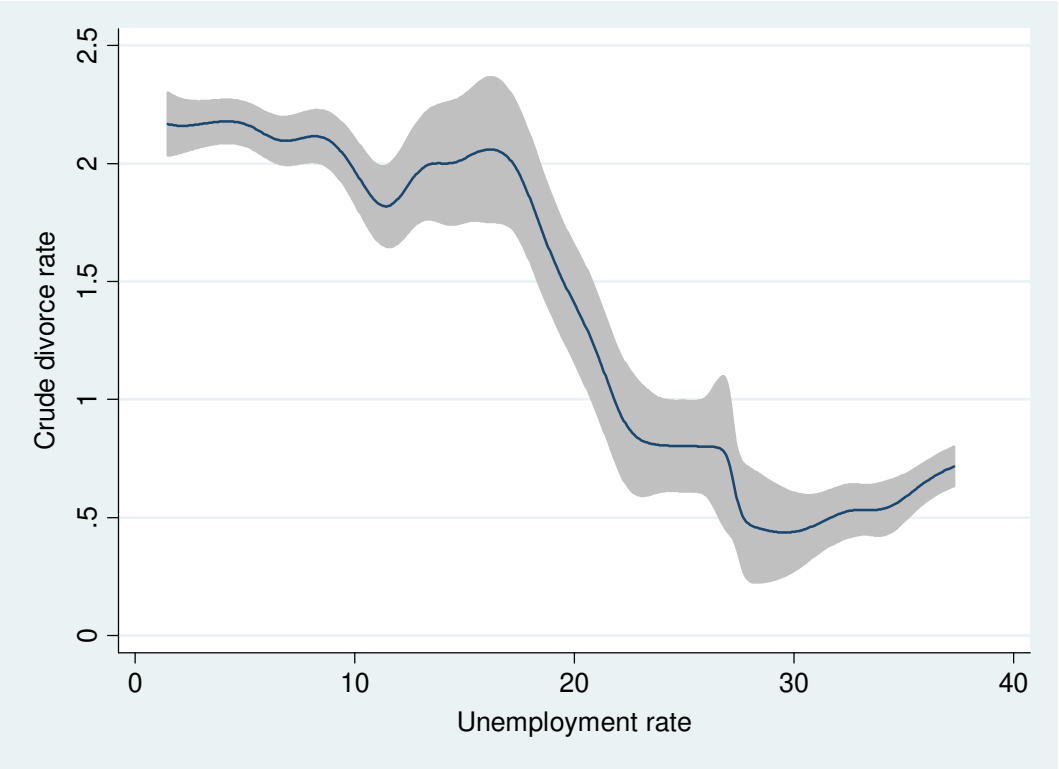


Table 1. Average divorce and unemployment rates by country

Country	Unemployment rate (1991-2010)	Crude divorce rate (1991-2010)
Austria	4.12	2.29
Belgium	8.07	2.85
Bulgaria	13.57	1.45
Croatia	11.88	1.00
Czech Republic	6.06	3.03
Denmark	5.99	2.63
Estonia	9.04	3.30
Finland	10.29	2.60
France	10.05	2.03
Germany	8.45	2.24
Greece	9.64	1.00
Hungary	8.40	2.40
Iceland	3.74	1.85
Ireland[1]	6.44	0.65
Italy	9.50	0.67
Latvia	12.31	2.92
Lithuania	12.77	3.11
Luxembourg	3.33	2.17
Macedonia, FYR	33.41	0.55
Netherlands	4.58	2.05
Norway	4.10	2.30
Poland	13.57	1.26
Portugal	6.30	1.85
Romania	7.12	1.52
Slovak Republic	14.11	1.90
Slovenia	6.43	1.09
Spain	15.93	1.31
Sweden	7.34	2.39
Switzerland	3.52	2.38
United Kingdom	6.83	2.67
Europe	9.25	2.00

Sources: World Development Indicators (The World Bank), Eurostat and United Nations Demographic Yearbooks.

[1]Ireland data from 1997 to 2010.

Table 2. Divorce rate models, OLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Unemployment rate	-0.072***	-0.018***	-0.019***						-0.019***
	(0.011)	(0.006)	(0.006)						(0.008)
Male Unemployment rate				-0.042**	-0.018***	-0.019***			
				(0.019)	(0.006)	(0.006)			
GDP Per Capita (ln scale)							0.433**	0.507	-0.183
							(0.194)	(0.438)	(0.693)
Median age			-0.064			0.012			
			(0.123)			(0.013)			
FLFP			0.014			-0.072			
			(0.014)			(0.124)			
Country fixed effects	N	Y	Y	N	Y	Y	N	Y	Y
Year fixed effects	N	Y	Y	N	Y	Y	N	Y	Y
Country x Time	N	Y	Y	N	Y	Y	N	Y	Y
Country x Time^2	N	Y	Y	N	Y	Y	N	Y	Y
R^2	0.163	0.964	0.965	0.046	0.964	0.965	0.077	0.964	0.965
Observations	594	594	584	594	594	584	590	590	590

Notes: Dependent variable: crude divorce rate. All the models include a constant. Robust standard errors clustered by country. All regressions are weighted by country population. Ireland data from 1997 to 2010. Female labor-force participation rate only available since 2001 in the case of Croatia. There is no information of the GDP per capita for Latvia and Lithuania until 1993. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table 3. Divorce rate models, lag specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment rate	-0.064*	-0.031***	-0.033***				-0.034***
	(0.032)	(0.007)	(0.009)				(0.010)
Unemployment rate t-1	0.056*	-0.015	-0.014				-0.014
	(0.030)	(0.020)	(0.018)				(0.022)
Unemployment rate t-2	-0.070***	0.021	0.023				0.019
	(0.019)	(0.016)	(0.018)				(0.017)
Male Unemployment rate				-0.032***			
				(0.009)			
Male Unemployment rate t-1				-0.012			
				(0.015)			
Male Unemployment rate t-2				0.019			
				(0.014)			
GDP Per Capita (ln scale)					3.014*	0.500	-0.203
					(1.717)	(0.629)	(0.684)
GDP Per Capita t-1 (ln scale)					-1.526**	0.031	-0.662
					(0.637)	(0.482)	(0.748)
GDP Per Capita t-2 (ln scale)					-0.992	0.308	0.217
					(1.418)	(0.539)	(0.456)
Median age			-0.009				
			(0.164)				
FLFP			0.017				
			(0.015)				
Country fixed effects	N	Y	Y	Y	N	Y	Y
Year fixed effects	N	Y	Y	Y	N	Y	Y
Country x Time	N	Y	Y	Y	N	Y	Y
Country x Time^2	N	Y	Y	Y	N	Y	Y
R^2	0.188	0.966	0.966	0.966	0.092	0.962	0.966
Observations	536	536	528	536	532	532	532

Notes: Dependent variable: crude divorce rate. All the models include a constant. Robust standard errors clustered by country. All regressions are weighted by country population. Ireland data from 1997 to 2010. Female labor-force participation rate is only available since 2001 in the case of Croatia. There is no information of the GDP per capita for Latvia and Lithuania until 1993. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Appendix A

Notes: Non-weighted averages for a pool of 30 European countries. Data on the Unemployment rate obtained from the World Development Indicators (The World Bank). The total divorce rate is calculated as the number of annual divorces per 1,000 married females. Data on divorces come from Eurostat and United Nations Demographic Yearbooks. Information on the number of women who are married is obtained from each census, (Source: United Nations Statistics, Census Hub, National Statistical Office). We filled in the gaps by linear interpolation.

Appendix B

Table B1. Total divorce rate models, OLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Unemployment rate	-0.359***	-0.084***	-0.089***						-0.093**
	(0.063)	(0.029)	(0.030)						(0.037)
Male Unemployment rate				-0.213**	-0.084***	-0.088***			
				(0.092)	(0.030)	(0.030)			
GDP Per Capita (ln scale)							2.376**	1.898	-1.439
							(0.929)	(1.896)	(3.129)
Median age			-0.319			-0.361			
			(0.550)			(0.558)			
FLFP			0.043			0.037			
			(0.060)			(0.059)			
Country fixed effects	N	Y	Y	N	Y	Y	N	Y	Y
Year fixed effects	N	Y	Y	N	Y	Y	N	Y	Y
Country x Time	N	Y	Y	N	Y	Y	N	Y	Y
Country x Time^2	N	Y	Y	N	Y	Y	N	Y	Y
R^2	0.165	0.971	0.971	0.048	0.971	0.971	0.095	0.970	0.972
Observations	594	594	584	594	594	584	590	590	590

Notes: Dependent variable: total divorce rate. All the models include a constant. Robust standard errors clustered by country. All regressions are weighted by country population. Ireland data from 1997 to 2010. The female labor force participation is available since 2001 in the case of Croatia. There is not information of the GDP per capita for Latvia and Lithuania until 1993. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.

Table B2. Total divorce rate models, lag specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Unemployment rate	-0.325**	-0.134***	-0.147***				-0.151***
	(0.156)	(0.033)	(0.039)				(0.045)
Unemployment rate t-1	0.265*	-0.066	-0.059				-0.065
	(0.138)	(0.091)	(0.081)				(0.101)
Unemployment rate t-2	-0.337***	0.093	0.100				0.079
	(0.094)	(0.071)	(0.079)				(0.072)
Male Unemployment rate				-0.140***			
				(0.041)			
Male Unemployment rate t-1				-0.056			
				(0.068)			
Male Unemployment rate t-2				0.085			
				(0.061)			
GDP Per Capita (ln scale)					15.988*	2.147	-0.986
					(8.316)	(2.650)	(2.853)
GDP Per Capita t-1 (ln scale)					-7.521**	0.058	-3.137
					(3.222)	(2.105)	(3.514)
GDP Per Capita t-2 (ln scale)					-5.733	0.786	0.142
					(7.103)	(2.427)	(2.091)
Median age			-0.250				
			(0.729)				
FLFP			0.065				
			(0.064)				
Country fixed effects	N	Y	Y	Y	N	Y	Y
Year fixed effects	N	Y	Y	Y	N	Y	Y
Country x Time	N	Y	Y	Y	N	Y	Y
Country x Time^2	N	Y	Y	Y	N	Y	Y
R^2	0.194	0.971	0.972	0.971	0.113	0.969	0.972
Observations	536	536	528	536	532	532	532

Notes: Dependent variable: total divorce rate. All the models include a constant. Robust standard errors clustered by country. All regressions are weighted by country population. Ireland data from 1997 to 2010. The female labor force participation is available since 2001 in the case of Croatia. There is not information of the GDP per capita for Latvia and Lithuania until 1993. ***Significant at the 1% level, **significant at the 5% level, *significant at the 10% level.